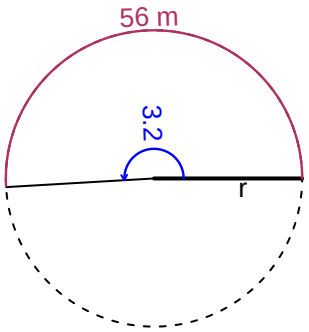
Name: Date:

Trig Final (SLTN v621)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.2 radians. The arc length is 56 meters. How long is the radius in meters?

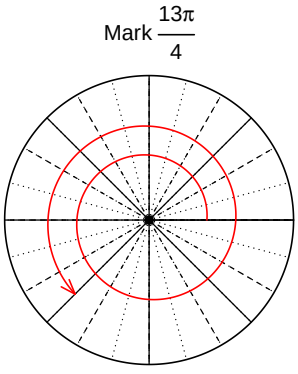


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

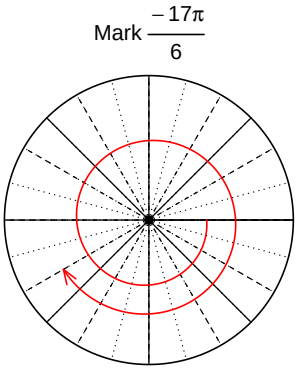
$r = 17.5$ meters.

Question 2

Consider angles $\frac{13\pi}{4}$ and $\frac{-17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{4}\right)$ and $\sin\left(\frac{-17\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(13\pi/4)$



Find $\sin(-17\pi/6)$

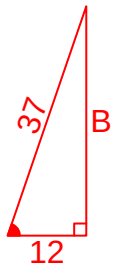
$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-17\pi/6) = \frac{-1}{2}$

Question 3

If $\cos(\theta) = \frac{-12}{37}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

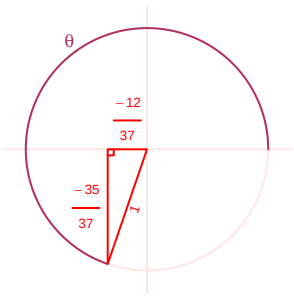
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$12^2 + B^2 = 37^2$$
$$B = \sqrt{37^2 - 12^2}$$
$$B = 35$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-35}{37}}{\frac{-12}{37}} = \frac{35}{12}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 7.52 Hz, an amplitude of 2.32 meters, and a midline at $y = -3.66$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 2.32\sin(2\pi 7.52t) - 3.66$$

or

$$y = 2.32\sin(15.04\pi t) - 3.66$$

or

$$y = 2.32\sin(47.25t) - 3.66$$